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WITNESS my hand this
Twenty-second day of July 2004

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PROVISIONAL SPECIFICATION FOR AN INVENTION ENTITLED

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The invention is described in the following statement :

This invention relates to a method for providing Wide Area Network (WAN) connectivity for geographically dispersed sites. In particular it relates to the provision of WAN connectivity in the context of the Australian geography of widely separated capital city and regional population centres.

- 5 Conventionally, WAN connectivity is provided by providing a series of capital city based WAN hubs using inter-capital transmission infrastructure for inter-hub connectivity, with variable length, but on average quite long, point-to-point dedicated services to provide site-to-hub connectivity, where signals from one of the capital city hubs are transmitted directly and indeed only to the
10 other end of that particular backbone connection which terminates on a hub of another capital city.

Further, such a backbone which is intended to carry high bandwidth information is set up as a dedicated circuit based channel system.

- 15 By this we mean that any communication requires a channel to be allocated for the transmission of a particular transmission purpose and each of a number of channels will be variously allocated to then be dedicated to transmit whatever information be this voice or data is provided.

- 20 Such a backbone connection can provide very fast communication speeds from main city hub to main city hub and geographically distant places are then connected by dedicated circuit based channels directly connecting the remote place to the closest hub.

- 25 There may of course be secondary hubs emanating from a main city hub but the system in existence at the present time is therefore a system based upon dedicated circuit based channels which will carry signals very quickly indeed along the backbone that may or may not transmit such signals at such a high rate to secondary hubs or even tertiary hubs or hub to point connections.

- 30 The difficulty with such an arrangement is that costs chargeable with respect to transmission of a signal necessarily relate to the capital cost of the equipment installed in order to transmit the signals and this can be directly dependent then upon the distance and also the switching hubs that a signal might have to go to in order to go from one point geographically in Australia to another point

geographically spaced apart in Australia.

Because of the current way that the network in existence operates, secondary or tertiary networking elements will be directly connected to the nearest capital city hub.

- 5 For a country town then, in Victoria for instance, to communicate with a country town in New South Wales, the signal from the Victorian country town may firstly be directed to a first transit transmission hub which we are terming a tertiary hub, then through a secondary hub and then to capital city hub in Melbourne which is then conveyed through a dedicated circuit based channel
- 10 to Sydney from whence again it will be then directed out by way of switching allocated channels to a secondary and tertiary hub and eventually to the location of a small country town.

However, the two country towns may be simply on opposite sides of the border between Victoria and New South Wales.

- 15 Nonetheless, the cost of communication passed on to the customer has to take into account the amount of equipment necessary in order to transmit that signal and has to therefore be very high indeed even though the physical distance apart of the two townships may be very small.

- 20 This description is intended to describe in a general sense a current system that is currently operating and which has the effect of establishing significant costs of using the communication network.

- 25 A first problem therefore exists that when using dedicated circuit based channel transmission techniques that it is also an economic challenge to put such equipment that is necessary to effect such switching of channels and effecting transmission at high speed along those channels at anywhere but main city hubs becomes a very expensive process in itself and also if a backbone connection was to be between closer hubs than there is necessarily a very high equipment installation cost, significant potential difficulties with increased capital cost on a very high speed backbone with potential increase
- 30 in challenge to any reliability and in any event, with installed secondary and tertiary hubs it can be argued that the use of a high speed dedicated circuit based channel backbone between only capital cities is generally the only

viable answer considering the economics as applied to this type of technology.

5 It does have the problem that if for any reason the backbone connection should fail, then literally all communication based upon this system between two states in Australia would also cease. It is of course possible and often the practice to provide geographically diverse protection routes, but this is an expensive option, since the additional capacity must remain largely unused under normal circumstances.

10 The problem we have seen therefore, in this currently existing system is that it implicitly causes high costs of communication to many outlying country towns and it would be broadly uneconomic with current thinking to provide a communication service other than by using, at least in the main, dedicated circuit based channel technology.

15 I have re-evaluated the current situation in Australia including an analysis of the amount of traffic that is sent between areas that are relatively distant from any capital city and I have now realised that it can be possible to provide a communication network installation that, at least in the main, will allow for reduced cost of communication and at the same time will provide again, at least in the main, a higher bandwidth capacity for communicating with
20 geographically remote other areas than is currently available.

Further, I have realised that this can be provided in a way that has less vulnerability to being cut off than is the case with the current system.

It is an object of this invention to provide at least some improvement over the current system or at least provide the public with a useful alternative.

25 My proposal, in a general sense, is to provide backbone transmission routes which I have termed High Bandwidth WAN Corridors based upon transmission using addressed digital logic packets and to provide a speed of transmission that will generally ensure that voice as well as data can be transmitted with the voice quality and continuity being of an acceptable standard for public
30 telecommunication purposes.

Using addressed digital logic packet techniques provides a significant number

of advantages which are simply not available in relation to dedicated circuit based channel communication techniques.

5 A first of these is that even an extremely high speed backbone route can be intersected providing a further intermediary hub or can be connected to a spur very economically.

Further, such an arrangement facilitates most hubs being able to route signals through at least two alternate paths so that in the event that one of these paths is destroyed, the other remains viable.

10 With this arrangement then, it becomes very economic to provide widely scattered locations through the country with both high speed data connection and voice communication at a very good, if not excellent quality, which will no longer require that the signals pass through a plurality of switching stations with the attendant long routes and expensive equipment necessary for this.

15 A typical speed of communication that will provide the quality of voice communication and at the same time, excellent data transmission for signals other than voice or equivalent signals, is 2.5 gigabits per second.

This is indicative of speeds that can currently be achieved with light fibres and in real terms, significantly higher speeds can be now achieved if useful with the amount of communication.

20 From an economic point of view in Australia, I have established that a communication using a 2.5 gigabits per second transmission rate of addressed digital packet logic would enable an enormous number of places geographically spread throughout Australia to be connected at relatively low cost to a very high speed connection which can be used both for conventional
25 voice communication or it can be used for internet or other digital transmission systems.

In the case specifically of Australia, I want to distinguish the current invention from a system which provides a light fibre connection between at least two capital cities, coupled and used for data transmission only.

30 Especially where this might be being used in the conventional mode, that is

that it is being used for end to end traffic only for digital data.

5 I have established that an installation can be used in a dramatically improved way providing very much needed communication at much higher speeds and at very high economies to most of the outer lying locations in Australia at costs which will be able to be accessed at very competitive economic rates indeed.

10 I distinguish my concept by establishing that it is a very high speed addressed digital packet logic incorporating and providing with that logic transmission both for general data and voice equivalent transmissions (voice equivalent transmissions means those signals that will normally be transmitted for use as analog signals eventually) and where, in connection with such a high speed communication which at the least provides for communication from end to end at this speed, will also have at least one intermediary take off providing either a spur connection to an intermediary hub or a hub as part of the connection.

15 Currently, such high speed connections are effected through light transmitting fibres and we therefore can further characterise the invention by being directed to at least one light transmitting fibre effective for carrying the signals and indeed carrying the signals and having some intermediary take off.

20 It is relevant that the invention is directed to a backbone communication system which will enable these significant improvements to be achieved in a general telecommunication system.

It currently, in most cases, is uneconomic to provide direct connections to an end user other than through installed equipment such as that which is currently provided by a telecommunication operator such as Telstra in Australia.

25 Given that we are talking about signals which are addressed digital packets, it is viable, both from a technical and economic point of view, to route these through a local telecommunication network for perhaps distribution to each end user at a local level.

30 Such communication would normally be by way of dedicated circuit based channel communication although it is not especially relevant to this invention as to what the end user connection might be.

For instance, for a larger user, there could be a direct connection and for smaller users, a connection via a router into the distributed mesh system in accordance with this invention.

5 Such an interconnection might therefore be with an appropriate gateway controlled interconnection at a local exchange.

10 In a preferred arrangement an economical communications carriage infrastructure includes packet communication networking hubs, configured as primary, secondary and tertiary hubs, geographically positioned to achieve economically optimum coverage and a transmission backbone network including at least one light transmitting fibre with means to extract signals from and apply signals to the fibre which are at least a proportion of end to end signals being carried by the fibre, said signals being extracted to and received from the packet communications networking hubs, at a plurality of selected locations, including at least one which is not located at a termination point of the fibre.

20 In a preferred arrangement, a logical connectivity scheme is constructed and is operated so that it provides a primary connectivity mesh linking primary hubs, at least one secondary connectivity mesh linking each secondary hub to at least two primary hubs, point to point connectivity between each tertiary hub and either one primary hub or one secondary hub or both and point to point connectivity between any hub and selected locations external to the communication network scheme.

25 The invention can be directed to both a method of operating a telecommunication network or an installation for providing a telecommunication network for both data and voice and voice equivalent transmission.

It would be expected that such a communication system would be directed at least along the backbone and directly interconnected mesh connections using solely addressed digital logic packet technology.

30 Preferably, the invention applies specifically to installations in Australia and provides for at least one communication network between Sydney and Melbourne which provides for a band width of at least approximately 2.5

gigabits per second and has at least one intermediate mode where the communication method is solely directed toward addressed digital packet transmission where both the digital and voice communication over such a backbone connection is by way of such addressed digital logic packets.

- 5 For a better understanding of this invention, it will be described with the assistance of drawings wherein Figure 1 illustrates the current networking backbone system;

Figure 2 illustrates the current hub connectivity system;

- 10 Figure 3 illustrates how there can be provided now, very economically, a networking backbone corridors system;

Figure 4 illustrates how such a networking backbone corridors system can enable an economical but very high bandwidth hub connectivity system for Australia;

- 15 Figure 5 illustrates how the networking backbone corridors system can be used to incorporate more hubs and to create bandwidth aggregation points for connections to multiple customers;

Figure 6 illustrates an extended high bandwidth hub connectivity system;

Figure 7 illustrates how this method can be applied to the city of Melbourne

- 20 Referring in detail to the drawings, Figure 1 the current networking backbone system based on high a bandwidth inter-capital transmission backbone comprised of dedicated circuit bases channels, providing connectivity between some of Australia's capital city hubs, and transmission backbones linking out-lying hubs to the capital city hubs. In this networking backbone system, provision of sufficiently high transmission speeds for carriage of data and voice traffic to and from hubs outside the capital cities, is uneconomical and is therefore only attempted when low traffic volumes are to be carried. For example, high transmission speeds between Sydney and out-lying hubs such as Griffith, Armidale, and Dubbo would be uneconomical.
- 25

These constraints in transmission backbone speeds have resulted in the

current hub connectivity system, illustrated in Figure 2. In this hub connectivity system it can be seen that high bandwidth connectivity is possible for inter-capital hub connectivity, but for other hubs it is constrained by the distance-dependent pricing of the transmission backbones between these hubs and their respective capital city hubs.

In contrast to the current networking backbone system illustrated in Figure 1, and referring specifically to Figure 3, it will now be seen as between Brisbane and Sydney that there are two parallel connections termed Corridor 1 and Corridor 2 and that in each of these, there are a number of intermediary hubs from which further direct connections can be made to more localised locations.

The same can be seen to be that position with connections between Sydney and Melbourne where there are now two routes, namely Corridor 3 and Corridor 4, which respectively go through a number of smaller hubs and towns, for instance Corridor 3 goes through Wollongong, and then to Canberra, Albury, Wangaratta and Corridor 4 goes from Sydney to Shepparton, Bendigo, Gisborne and then Melbourne.

A single Corridor 5, connects from Melbourne through Adelaide to Perth, and in this case, an intermediary connection between Melbourne and Adelaide can be in Geelong and Ballarat.

An intermediary connection between Adelaide and Perth can be at Kalgoorlie, but of course, there can be a number of further intermediary hubs which will be of relatively small cost and provide those connections with very high quality and high speed voice and digital communication.

With a secondary connectivity mesh which may be at a somewhat lesser speed than would be available through light transmitting fibres, there can now be seen to be a number of interconnections that can be made which provide still very high quality communication even though the quantity of traffic might be less.

Figure 4 shows high bandwidth connectivity for both secondary and tertiary hubs that now becomes possible again at very significant cost savings.

5 Figure 5 illustrates how the networking backbone corridors system can be used to incorporate more hubs and to create bandwidth aggregation points for connections to multiple customers.

It is then possible to establish an extended high bandwidth hub connectivity system such as illustrated in Figure 6.

10 The same method of high bandwidth networking backbone corridors can further be applied to the geographic area of a capital city. Figure 7 illustrates how this method can be applied to the city of Melbourne, thereby further extending the national and regional networking backbone corridors system, to include a specific metro networking backbone corridors system that is appropriately integrated with the former.

15 The tertiary hubs can be connected by using currently installed infrastructure except that the connection's distance to a main hub or to a sufficiently high speed connecting hub is very much less than has hitherto been the case in existing telecommunication networks.

20 What can now be seen to have been provided is a communication network method and installation which provides for a economical communications carriage to carry both data and voice and voice like signals solely as addressed digital logic packets by providing this at least in a backbone system and distributed mesh networks such that the speed of communication will be sufficient to provide very good voice or other equivalent analog signal transmissions as well as data.

25 This is provided by a transmission speed of at least approximately 2.5 gigabits per second along a main backbone and uniquely capable, and in fact having intermediary connections providing for mesh communication networks both for primary and secondary networks where secondary would be normally at a transmission speed that might be a proportion only of the main backbone
30 communication bandwidth.

Throughout the specification, the purpose has been to illustrate the invention and not to limit this.

Dated this 14th day of July 2003

5 STEVEN LUZIMA MUTABAZI

By his Patent Attorneys

COLLISON & CO

Prior Art

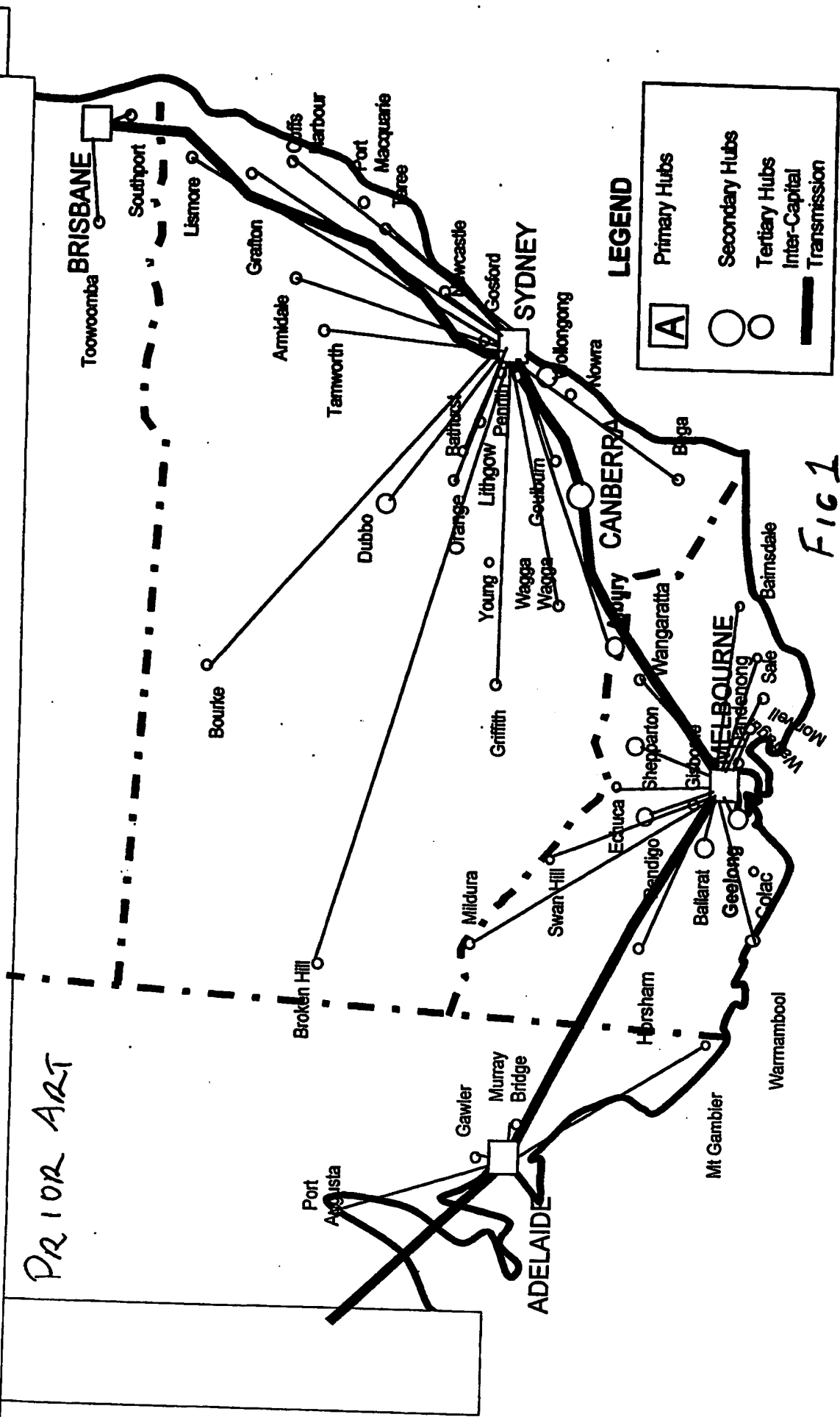
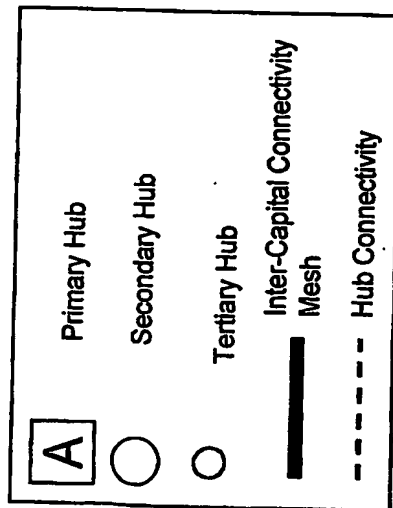


FIG 1

FIG 2

LEGEND



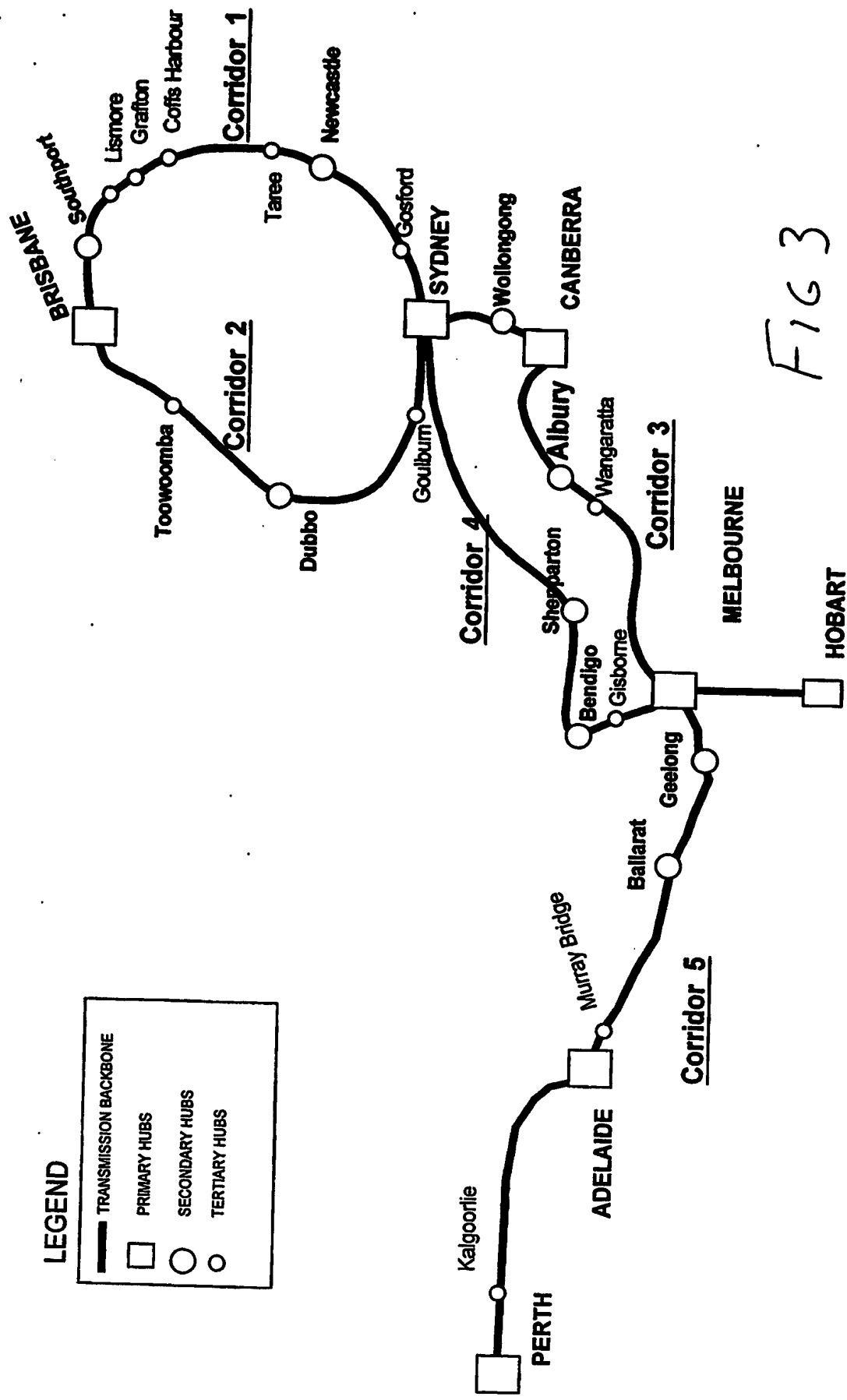


FIG 3

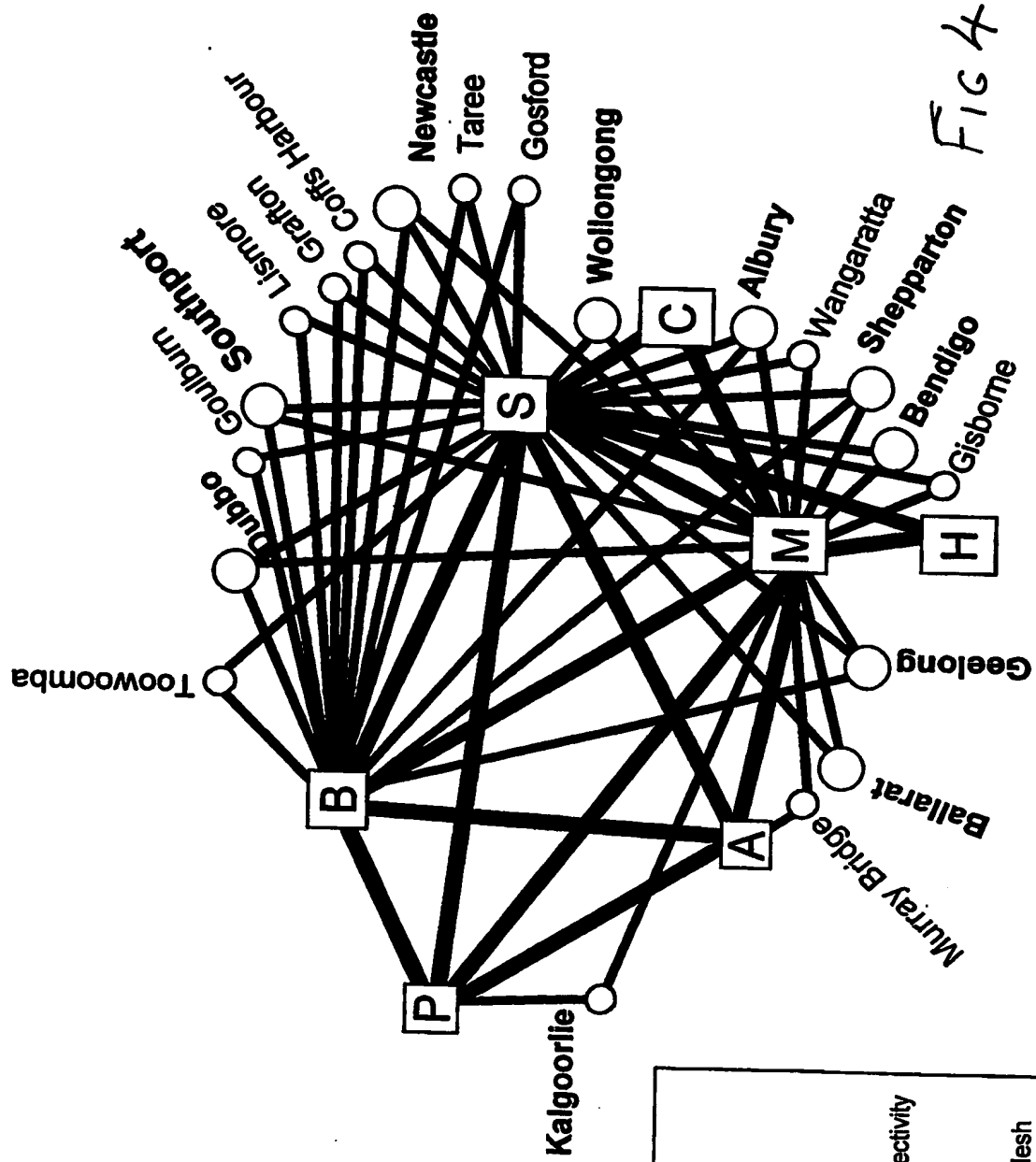


FIG 4

LEGEND

A	Primary Hub
○	Secondary Hub
○	Tertiary Hub
—	Primary Connectivity
—	Secondary Connectivity

LEGEND

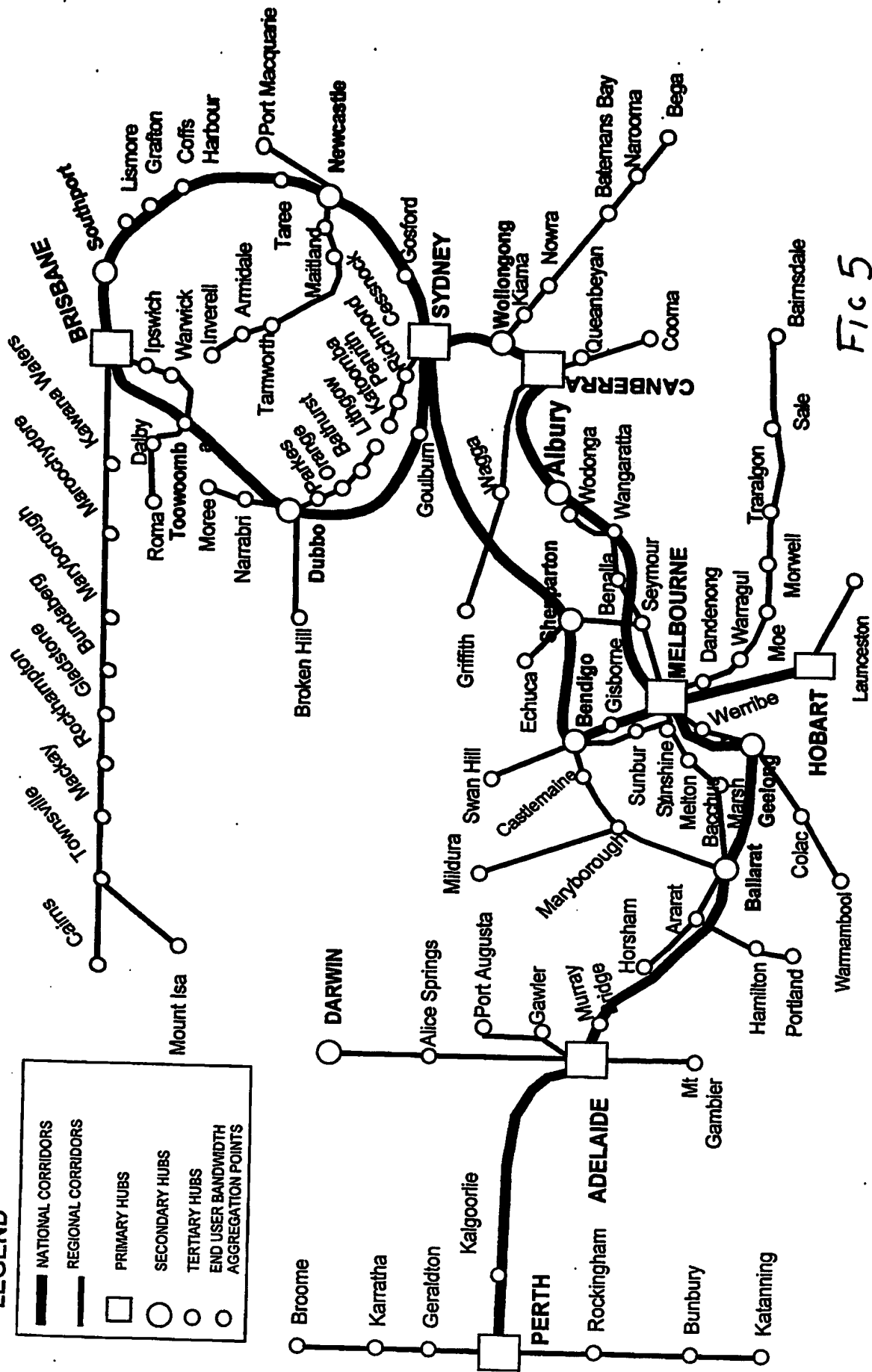
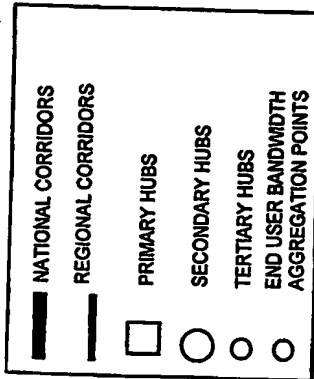
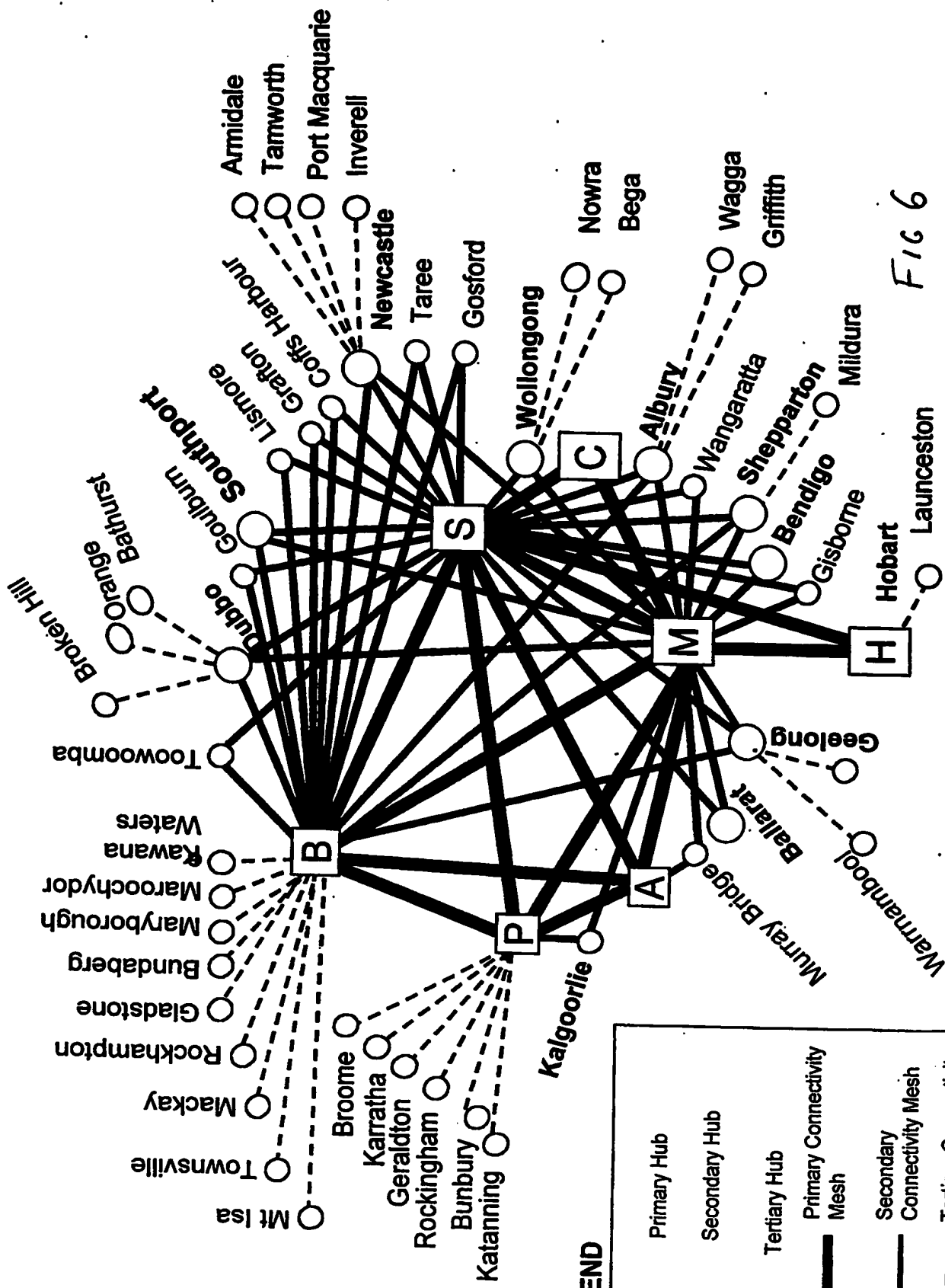


FIG 5



LEGEND

A	Primary Hub
○	Secondary Hub
○	Tertiary Hub
—	Primary Connectivity
—	Secondary Connectivity
- - -	Tertiary Connectivity

Fig 6

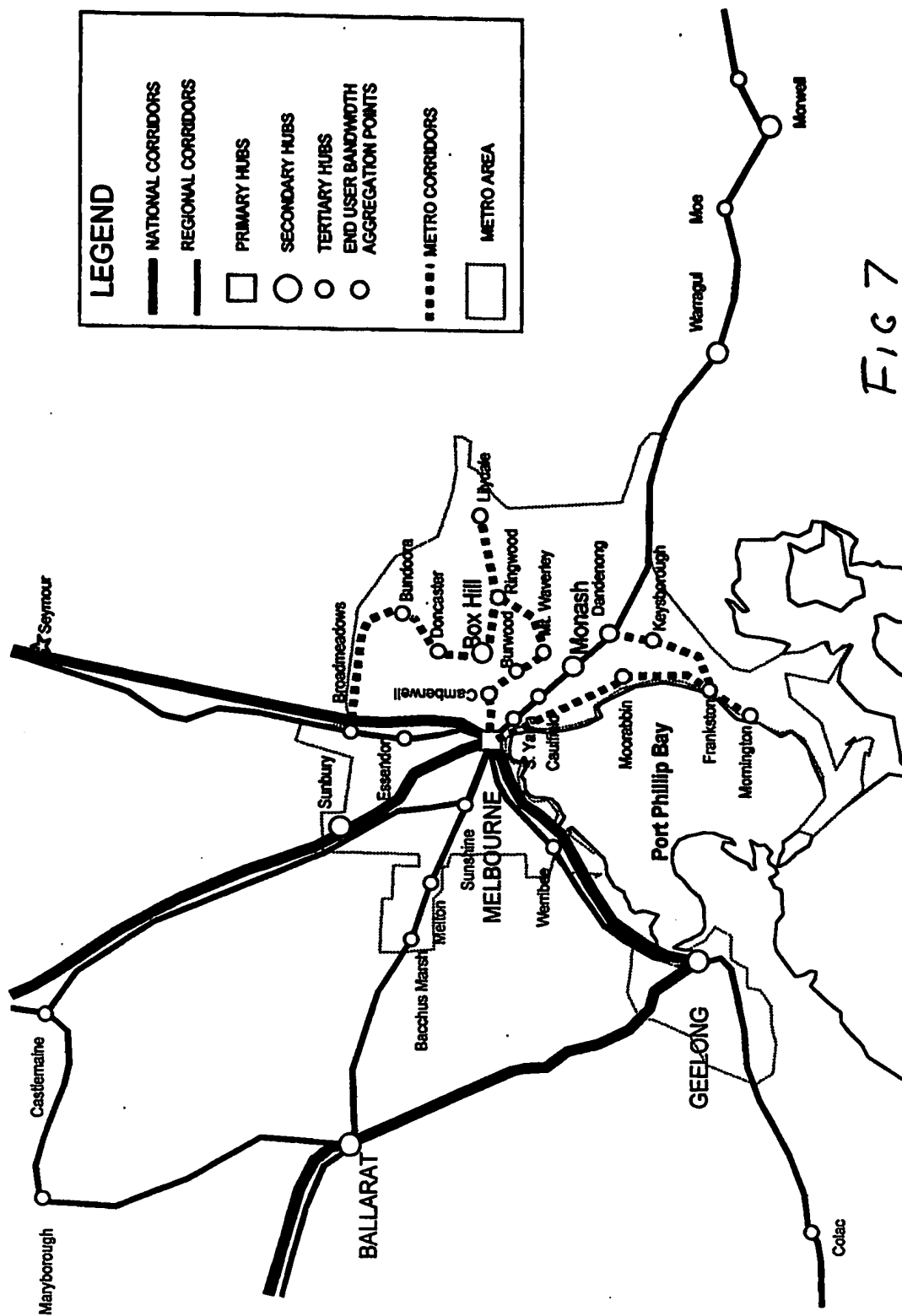


FIG 7

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